Evaluation of Fungicides and Fungicide Timing for the Management of *Phakopsora pachyrhizi* in the United States

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Introduction:

Timing of fungicide applications is a critical component in managing soybean rust and, if used effectively, may reduce the number of applications needed for economic benefit. The objective of these experiments was to evaluate the effect of different timings of fungicide applications on soybean rust severity and yield. Trials were conducted in four locations in the United States. Two locations had soybean rust and at the other two locations no soybean rust was present. The locations with soybean rust were at the Univeristy of Florida's North Florida Research and Education Center in Quincy, FL and at the University of Georgia's Research Farm in Attapulgus, GA. The locations without soybean rust were at the University of Illinois in Urbana, IL and at North Dakota State University in Fargo, ND.

Materials and Methods:

• A representative variety was planted at each location in the 2006 growing season

•Treatments in each field included applications with: triazole (Folicur), strobilurin (Headline), or triazole-strobilurin combinations (Quilt or Headline + Folicur)

• Fungicides were applied at either (i) growth stage (GS) R1, (ii) GS R3, (iii) GS R5, (iv) GS R1 and R3, (v) GS R3 and R5, (vi) GS R1, R3, and R5, or (vii) untreated control

• Fungicides were applied with a backpack sprayer in North Dakota and Illinois. In Florida a platform sprayer was used and in Georgia a Lee Spider was used. In all locations 15 gpa of water was the target application volume

• Yields were taken from the center two rows of the four row plot and adjusted to 13% moisture for all of the locations except Georgia where the yield was not adjusted

• Soybean rust ratings were based on a 0 to 5 scale with 0 having no rust and 5 having severe rust

Figure 1: Lee Spider used in Attapulgus, GA and platform sprayer used in Quincy, FL

Figure 2: Progression of soybean rust in Quincy, FL plots

Table 1: Final soybean rust severity (if present) and yield means for all locations

	Fargo, ND	Urbana, IL	Attapulgus, GA		Quincy, FL	
Timing	Yield (bu/A)	Yield (bu/A)	Rust Severity	Yield (bu/A)	Rust Severity	Yield (bu/A)
R1	13.0	58.6	3.2	67.0	4.5	47.1
R3	14.1	59.3	2.3	70.3	3.6	54.0
R5	9.5	57.9	2.6	64.8	2.9	56.7
R1 and R3	13.4	59.2	1.5	69.6	3.1	56.3
R3 and R5	11.5	56.9	1.3	72.6	2.4	60.3
R1, R3, and R5	.	58.4	.	.	1.5	65.0
Untreated Control	12.0	51.8	5.0	54.5	4.8	42.2
mean	12.3	57.4	2.7	66.4	3.3	54.5

Table 2: Results from all locations

	Fargo, ND	Urbana, Illinois	Attapulgus, Georgia			Quincy, Florida		
Treatment (rate) @ growth stage	Yield (bu/A)	Yield (bu/A)	Rust Severity	AUDPC	Yield (bu/A)	Rust Severity	AUDPC	Yield (bu/A)
Headline (9.2 oz/A) @ R1	11.3	63.2 a	3.50 b	28.0 b	63.4 cde	4.25 abcd	48.33 bc	348.0 ij
Headline (9.2 oz/A) @ R3	14.5	60.9 abc	2.00 defg	18.4 cde	72.6 abc	3.00 fghi	35.45 f	454.6 fgh
Headline (9.2 oz/A) @ R5	10.6	61.5 abc	2.00 defg	16.6 defg	62.3 de	2.50 hijk	45.31 ef	354.9 fgh
Folicur (4 oz/A) @ R1	11.1	54.7 def	3.00 bcd	28.9 b	70.6 abcd	4.50 abc	30.20 cd	349.3 ij
Folicur (4 oz/A) @R3	15.9	58.7 abcde	1.75 efgh	8.8 fgh	70.8 abcd	3.50 defg	13.54 f	457.3 defg
Folicur (4 oz/A) @ R5	9.8	55.5 cdef	2.25 cdef	17.5 cdef	64.6 bcd	2.50 hijk	7.20 f	460.1 abcde
Folicur (4 oz/A) @ R1 and R3	.	58.7 abcde	.	.	.	3.25 efgh	51.43 gh	456.6 efg
Folicur (4 oz/A) @ R3 and R5	.	57.1 abcdef	.	.	.	2.00 jkl	7.20 hij	462.7 abc
Folicur (4 oz/A) @ R1, R3 and R5	.	58.4 abcde	.	.	.	1.50 l	7.20 j	465.0 a
Quilt (14 oz/A) @ R1	16.7	56.4 bcdef	3.00 bcd	21.9 bcde	66.8 abcd	5.00 a	54.51 b	445.4 jk
Quilt (14 oz/A) @ R3	11.9	56.8 bcdef	3.25 bc	25.4 bcd	67.4 abcd	4.75 ab	43.43 bc	446.4 jk
Quilt (14 oz/A) @ R5	8.1	59.0 abcde	3.50 b	26.3 bc	67.3 abcd	4.25 abcd	33.33 cd	450.0 hij
Quilt (14 oz/A) @ R1 and R3	14.8	59.7 abcde	2.50 bcde	20.1 bcde	72.4 abc	4.00 bcde	36.36 f	448.0 ij
Quilt(14 oz/A) @ R3 and R5	9.2	54.2 ef	2.00 defg	15.8 efg	73.0 ab	3.75 cdef	43.43 def	452.8 ghi
Folicur (3 oz/A) + Headline (6 oz/A) @ R1	.	60.0 abcde	.	.	.	4.25 abcd	20.20 cde	445.6 jk
Folicur (3 oz/A) + Headline (6 oz/A) @ R3	.	60.5 abcd	.	.	.	3.25 efgh	28.28 gh	457.8 cdefg
Folicur (3 oz/A) + Headline (6 oz/A) @ R5	.	55.6 cdef	.	.	.	2.50 hijk	15.15 fg	462.0 abcd
Folicur (3 oz/A) + Headline (6 oz/A) @ R1 and R3	.	55.7 cdef	.	.	.	2.50 hijk	hi	460.5 abcde
Folicur (3 oz/A) + Headline (6 oz/A) @ R3 and R5	.	55.4 cdef	.	.	.	1.75 kl	9.9 ij	462.7 abc
Headline (9.2 oz/A) @ R1, Folicur (4 oz/A) @ R3	13.7	59.8 abcde	0.75 h	6.1 h	68.0 abcd	3.00 fghi	15.20 gh	458.7 bcdef
Headline (9.2 oz/A) @ R3, Folicur (4 oz/A) @ R5	14.9	57.3 abcdef	1.00 gh	8.8 fgh	75.1 a	2.00 jkl	10.20 hij	463.3 ab
Folicur (4 oz/A) @ R1, Headline (9.2 oz/A) @ R3	11.8	62.3 ab	1.25 fgh	7.9 gh	68.4 abcd	2.75 ghij	15.20 gh	457.8 cdefg
Folicur (4 oz/A) @ R3, Headline (9.2 oz/A) @ R5	10.5	60.5 abcd	1.00 gh	6.1 h	69.6 abcd	2.25 ijkl	66.66 hi	460.0 abcde
Untreated control	12.0	51.8 f	5.00 a	51.6 a	54.5 e	4.75 ab	30.30 a	342.2 k
mean	12.3	58.1	2.36	19.3	67.9	3.2		755.1
lsd	NSD	6.2	1.04	9.4	9.6	0.9	8.7	5.1

Results:

Fargo, North Dakota: There was no soybean rust at this location, and the yield was not significantly different for different treatments.

Urbana, Illinois: There was no soybean rust at this location, but 13 of the 23 treatments had significantly higher yields than the untreated control.

Attapulgus, Georgia: Rust was first detected at GS R5. soybean rust severity was significantly less than the untreated control for all treatments and 13 of the 15 treatments had higher yield than the untreated control.

Quincy, Florida: Rust was first detected at GS R5. The final soybean rust severity was significantly less for 17 of the 24 treatments and 20 of the 24 treatments had higher yields than the untreated control.

Conclusions:

• In general the fungicides Headline and Folicur were more effective for the control of soybean rust than Quilt

• In general rust severity was lower and yields were higher when more than one application of fungicide was used

• The best time to apply fungicides depended on when the field was infected with soybean rust

• In locations without soybean rust, some treatments had higher yields than the untreated control

• For more detailed information contact Tristan Mueller at tmueller@uiuc.edu

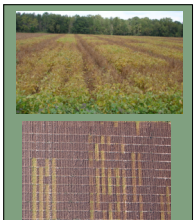

Figure 3: Photos of Quincy, FL plots